REMARKS

The following claims are pending in the application:	1 – 14, 17 – 30 and 33
The following claims have been amended:	1 and 5
The following claims have been deleted:	18 – 30 and 33
The following claims have been added:	Not applicable

As a result of the foregoing Amendment, the following claims remain pending in the application: 1 – 14 and 17.

The Rejection Under 35 U.S.C. §112, second paragraph

The Examiner rejects claims 1 – 14 and 17 under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Specifically, the Examiner takes the position that the phrase "said layer" on line 13 of claim 1 renders claims 1 – 14 and 17 indefinite because it is unclear if "said layer" refers to the layer of molecular units or the layer having conductance of the second conductive component.

Applicant has amended claim 1 to clarify that the layer referred to at line 13 is the metal/metal oxide layer. Support for said amendment is contained throughout the present application and particularly at paragraph **[0048]**.

Amendments to Claim 5

Applicant has amended claim 5 to correct an obvious typographical error. Applicant respectfully submits that no new matter is introduced by such amendments.

The Rejection Under 35 U.S.C. §102(b)

The Examiner rejects claims 1 – 6, 9 – 14 and 17 under 35 U.S.C. §102(b) as being anticipated by Zhou et al. In so rejecting, the Examiner takes the position that Zhou teaches a molecular wire comprising a monolayer of parallel, biphenyl units covalently bonded to the surface of a gold electrode. The Examiner states that a layer of titanium and gold is formed over the monolayer to form a top electrode. The Examiner reasons that because the top electrode is exposed, at least some of the outer surface will inherently oxidize resulting in a top electrode that comprises both a metal and a metal oxide wherein the metal oxide is gold oxide and/or titanium oxide. Further, the Examiner states that when either a positive or negative voltage differential is applied across the electrodes, electrons flow to the monolayer from one of the electrodes (see pg. 612, col. 2 and pg. 613, col. 1). The Examiner broadly states that a reaction involving the transfer of electrons is a redox reaction.

Applicant has amended claim 1 to more accurately claim the subject matter of the present invention – particularly, that the layer of metal/metal oxide in the second conductive component is in direct electrical communication with the second ends of the molecular units present in the first conductive component and that a redox reaction occurs between the layer of metal/metal oxide and the layer of molecular units causing a reversible change in the conductance of the layer of metal/metal oxide. Support for said amendment can be found throughout the present application and particularly at paragraph **[0048]**. Applicant respectfully submits that Zhou et al. fails to teach (1) a layer of metal/metal oxide in direct electrical contact with the second ends of the molecular units present in the first conductive component or (2) that a redox reaction occurs between the

layer of metal/metal oxide and the layer of molecular units causing a change in the conductance of the metal/metal oxide layer. Furthermore, Applicant respectfully submits that Zhou et al. is silent as to the presence of a metal oxide species in any layer. Accordingly, as Zhou et al. fails to teach each and every limitation of the present invention as provided in presently amended claims 1 – 6, 9 – 14 and 17, Zhou et al. cannot be fairly said to anticipate the present invention. Thus, the Examiner's outstanding rejection based upon Zhou may be properly withdrawn.

The Examiner rejects claims 1 – 7, 9 – 14, 17 – 26, 29, 30 and 33 under 35 U.S.C. §102(e) as being anticipated by Gryko et al. (US Pat. No. 6,324,091). In so rejecting, the Examiner takes the position that Gryko teaches an apparatus for storing data comprising a storage medium having first and second subunits coupled to a working electrode (corresponding to substrate of first conductive component) and a reference electrode (corresponding to the second conductive component) (Fig. 1 and col. 3, ll. 53 – 60). The Examiner states that the apparatus operates by oxidizing the storage medium (col. 3, ll. 20 – 28). The Examiner further states that the storage device optionally includes an electrolyte, i.e. an electrolyte is not required (col. 23, ll. 64 – 65), and, when present, the suitable electrolyte is a polymer layer, i.e., not an electrolytic solution (col. 27, ll. 34 – 44). The Examiner further takes the position that Gryko discloses that suitable subunits include various compounds having substituted and unsubstituted phenyl groups, such as porphyrinic macrocycles, metallocene, etc. (Col. 3, ll. 60 – col. 4, ll. 6). The Examiner additionally takes the position that Gryko discloses that the storage molecule is electrically coupled to the electrode by either a direct covalent link (i.e., R—X chemical bond) or direct or indirect ionic bonding (which is taken to read on "strong electronic coupling")

(Col. 7, ll. 46 – 65). The Examiner further takes the position that Gryko discloses that the molecules self-assemble on the electrode substrate (e.g., a metal such as gold) to form an organized monolayer that may be arranged in an upright orientation (Col. 23, ll. 40 – 57). The Examiner interprets this orientation to indicate that the molecules of the self-assembled layer will be substantially parallel to each other. The Examiner also takes the position that Gryko discloses that the electrodes may be formed of a metal such as gold, silver, or copper (Col. 52 – 58). The Examiner takes the position that because the electrodes are exposed, at least some of the outer surface will inherently oxidize resulting in electrodes that comprise both a metal and a metal oxide wherein the metal oxide is gold, silver, or copper oxide. Furthermore, the Examiner comments that an alternative embodiment shown in Figure 4 comprises a mirror image construct. In the alternative embodiment, the Examiner takes the position that one working electrode and storage medium reads on the first conductive component and the other working electrode and storage medium reads on the second conductive component.

Applicant hereby cancels claims 18 – 30 and 33 without prejudice and expressly reserves the right to pursue said claims through one or more related applications. Furthermore, Applicant has amended claim 1 to more accurately claim the subject matter of the present invention – particularly, (1) that the layer of metal/metal oxide in the second conductive component is adjacent to, and in direct electrical communication with, the second ends of the molecular units present in the first conductive component and (2) that a redox reaction occurs between the layer of metal/metal oxide and the layer of molecular units causing a reversible change in the conductance of the layer of metal/metal oxide.. Support for said amendment can be found throughout the present application and

particularly at paragraph **[0048]**. Applicant respectfully submits that Gryko et al. fails to teach or suggest a metal/metal oxide layer that undergoes a reversible change in conductance in the layer of metal/metal oxide in response to a reduction-oxidation reaction occurring when a voltage is applied across said electronic junction. Instead, Gryko appears to teach the use of a storage molecule – that is, a molecule having first and second subunits wherein the first and second subunits are tightly coupled such that oxidation of the first subunit alters the oxidation potential of the second subunit. See col. 3, ll. 53 – 60. Accordingly, Gryko cannot be fairly said to teach the use of a metal/metal oxide layer as in the present invention. Thus, Applicant respectfully submits that the Examiner's outstanding rejection based on Gryko et al. may be properly withdrawn.

The Rejection Under 35 U.S.C. §103(a)

The Examiner rejects claims 7 and 8 under 35 U.S.C. §103(a) as being unpatentable over Zhou et al.

With regard to claim 7, the Examiner takes the position that Zhou teaches all of the limitations of claim 7 except for chemically bonding a carbon or oxygen atom of the molecular unit to a metal, silicon, or carbon unit of the substrate. The Examiner takes the position that Zhou teaches a chemical linkage of metal-S formed by the use thiol functionalized biphenyl. Despite this, the Examiner reasons that it would be obvious to one skilled in the art to use the analogous alcohol functionalized biphenyl (which would result in a metal-O chemical bond) since thiols and alcohols have a similar structure and are known to behave in an analogous manner.

Applicant has amended claim 1 from which claim 7 is dependent. Applicant respectfully submits that the outstanding rejection of claim 7 may be properly withdrawn based on the same argument as provided in response to the rejection of claims 1 – 6, 9 – 14 and 17 over Zhou et al. above.

With regard to claim 8, the Examiner takes the position that Zhou teaches all of the limitations of claim 8, except for the use of electrically conductive carbon as the bottom electrode. Despite this, the Examiner takes the position that it would have been within the ability of one skilled in the art to select any known electrically conductive material, including electrically conductive carbon, for the bottom electrode since the function of the bottom electrode is to conduct electricity.

Applicant has amended claim 1 from which claim 8 is dependent. Applicant respectfully submits that the outstanding rejection of claim 7 may be properly withdrawn based on the same argument as provided in response to the rejection of claims 1 – 6, 9 – 14 and 17 over Zhou et al. discussed above.

The Examiner rejects claims 8, 27, and 28 under 35 U.S.C §103(a) as being unpatentable over Gryko et al. taking the position that Gryko teaches all of the limitations of claims 8, 27 and 28 except for the use of electrically conductive carbon as the working electrodes. The Examiner further takes the position that although Gryko discloses gold as the preferred material, it recognizes numerous other materials suitable for use as the electrode including other metals, metal alloys, organic conductors, nanostructures, crystals, etc. (col. 26, ll. 52 – 58). Thus concludes the Examiner, it would have been within the ability of one skilled in the art to select any known electrically conductive

material, including electrically conductive carbon, for the working electrode since the function of the working electrode is to conduct electricity.

Applicant has cancelled claims 27 and 28. Furthermore, Applicant has amended claim 1 from which claim 8 is dependent. Applicant respectfully submits that the outstanding rejection of claim 7 may be properly withdrawn based on the same argument as provided in response to the rejection of claims 1 – 7, 9 – 14, and 17 over Gryko et al. above.

CONCLUSION

In view of the foregoing amendment and accompanying remarks, the Applicants respectfully submit that the present application is properly in condition for allowance and may be passed to issuance upon payment of the appropriate fees.

Telephone inquiry to the undersigned in order to clarify or otherwise expedite prosecution of the subject application is respectfully encouraged.

Respectfully submitted,

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